In man, there is not, indeed, a habit, but an organ which has lost its uses, yet is still developed in every child brought into the world. The outer ear was formerly provided with muscles by which it could be turned towards any sound for its better recognition. These muscles have become obsolete by heriditary disuse, so that in all normal subjects the ear is motionless. That it could formerly be directed so as the better to receive a sound will the less be denied as it survives in certain exceptional individuals. But as it is absent in the great bulk of our species, the question arises, Why does the external ear not gradually cease to be developed? No one can now contend that it is useful.

J. W. SLATER.

London, England.

Speed of Flight of Birds.

I HAVE always been more or less of a sceptic in regard to the high rate of speed in the flight of certain birds, but I have only just obtained a bit of satisfactory evidence from my own observations. Our wild ducks are admitted to be among our strongest flyers, but I am satisfied that the buffle-head (*Charitonetta albeola*) does not attain a speed of forty miles per hour. While travelling on the Baltimore and Ohio Railway, up the valley of the Potomac, on Jan. 3, I saw a great many ducks, nearly all of which were buffle-heads. Those who are familiar with the road will recall how closely it follows the windings of the river, so that a bird flying up mid-stream would travel just the same distance as the train on the bank. It so happened that, on rounding a sharp curve, my train flushed a pair of buffle-heads, which started up stream at full speed. On watching them I found that, instead of leaving us behind, we were actually beating them, and I am confident that their rate of speed was not equal to that of the train. We kept alongside of them for nearly a minute before they turned back down-stream. Careful calculation showed that the train was running at about thirty-seven miles per hour, so that the rate of speed for those wild ducks would be about thirty-six. I hope that others may have some evidence on this question of speed in flight which will throw more light on the subject.

HUBERT LYMAN CLARK.

Pittsburgh, Pa.

Bowser's Trigonometry.

As I have learned to admire the mathematical text books of Professor Bowser from the excellent results I have had from their class room use for several years, I was surprised to see the somewhat adverse criticism of his Trigonometry in *Science* of Nov. 25. I disagree with your critic's assertion that the best way to study trigonometry is along the line of its historical development. I believe that such a course of study would be objectionable, because of the long time it would require, and because the student would be compelled to unlearn, if I may so phrase it, many things he would necessarily be called upon to learn if he followed the historical method. It is a recognized pedagogical fact that it is easier to teach correct methods to a student who has never used incorrect methods, than to one who has. To acquire a complete knowledge of trigonometry would undoubtedly require a study of its development, to acquire the knowledge required for its proper and facile use in its many applications, does not require a study of its history.

And accordingly I believe his plan of giving the best results and methods of the best students and workers in trigonometry is to be preferred to a method which requires a student to test and reject what has long before been tested and rejected. I admire Professor Bowser's plan of giving such definitions of the functions as apply to all angles, acute, obtuse or reflex. I think some of the writers on the subject have fallen into a grave error when they give definitions of the functions of acute angles, and afterward modify the definitions to suit obtuse angles.

In Professor Bowser's development of the theoretical part of the subject, he is especially clear. His book is a readable one. He is precise in his statements, and his demonstrations are such as the average student can readily follow—which cannot be said of every book on the subject.

The collection of exercises and examples is an unusually large one, suited to every requirement, while the model solutions are truly model in their methods and arrangement. His chapter on De Moivre's Theorem is more complete than is usually given in text-books, while his final chapter on the application of spherical trigonometry serves at once to show the student its use, and to give him a glimpse of several fascinating branches of mathematics.

Your critic is hardly justified in his claim that Professor Bowser has made several historical mistakes. It is unfortunate that Professor Bowser should imply that Napier was the inventor of what are now called Napierian logarithms; but surely he is right in saying that Briggs introduced the common system in 1615, since it is generally admitted that Briggs lectured on them in that year, though his tables were not published until two years later. And why your critic should object because Professor Bowser, in speaking of addition and subtraction logarithms, refers to Zech's tables, I fail to understand, since Zech's tables are equal if not superior to any others published.

Of course, only a class-room test can determine the merits of a text-book, but this latest book of Professor Bowser is so filled with the many qualities which have made his previous books so successful that I cannot see any reason why it should not meet with a like success. H. L. HODGKINS, Professor of Mathematics.

Columbian University, Washington, D. C., Jan. 5.

Humming-Bird's Food.

IN several recent numbers of *Science* there have been notices of the habit of *Trochilus colubres* feeding on the sap of different trees. I have also noticed the fact, and was interested on becoming acquainted with *T. anna* to find that it also made this a staple article of food during the summer and fall. In this part of California there are few trees yielding a sap save the cottonwood and willow.

During a mountain trip in August, 1890, I found the humming-bird very common in the willows along the creeks, at about 5,000 feet elevation; and was pleased to find that the red-breasted sap-sucker (*Sphyrapicus rufer*) filled the office of *S. varius* to the ruby-throat. The willow thickets were very dense and composed mostly of dwarfish shrubs of *Salix lariolepis*. I forced my way into the interior, and watched the birds; sap-suckers, humming-birds, and warblers (*Dendroica auduboni*), often waiting turns at a favorite drinking-spot; though possibly the latter were more interested in the insects attracted by the honey than by the honey itself. There were often three, and even four or five, humming-birds in sight at a time. They were very tame, and very curious; coming within three or four feet of me, poising themselves on their wings and looking me over. I noticed most of these were young, and that the adult males were quite shy.

Subsequently, while teaching at Dunlap, at about 3,500 feet elevation, I found the birds as late as December feeding in the same manner.

Irrigation seems to have an important influence on the habitat of this bird.

For three years I have lived most of the time in the southern half of Fresno County, in an open plain. For the first two years I saw but very few humming-birds, and never saw them feeding on the native flowers, no matter how showy they were.

Meanwhile, the water had formed a pond by sub-irrigation on the ranch, and the same variety of willow (*Salix lariolepis*), which in the valley forms a tree 40–60 feet high and 3–5 feet in diameter, had come in thickly and grown to about 15 feet in height. This fall I noticed many humming-birds about the place, and traced them to this pond.

I have never seen but one or two sap-suckers here, but I found the birds in great numbers feeding on the sap exuding from the wounds caused by a large borer, the moth of which, about two inches across the wings, colored black and white, was flying about in abundance.

I have not as yet found them feeding upon any tree save this willow. Maples are very scarce in the Sierras of this county, and the sap-suckers prefer willows to any other tree. I have not observed that the squirrels score the bark of trees here as in the